

Appl. No. 10/613,254
Examiner: Garcia, Joannie A, Art Unit 2823
In response to the Office Action dated January 21, 2004

Date: April 5, 2004
Attorney Docket No. 10112381

REMARKS

Applicant thanks the Examiner for her indication of allowable subject matter in claims 4, 6, 9, 10, 11, 13-24 and acknowledging Applicant's claim to foreign priority and receipt of the certified copy of the priority document. Responsive to the Office Action mailed on January 21, 2004 in the above-referenced application, Applicant respectfully requests amendments of the above-identified application in the manner identified above and that the patent be granted in view of the arguments presented. No new matter has been added by this amendment.

Present Status of Application

Claims 1-29 are pending. Claim 13-21 and 24 are allowed. Claims 4, 6 and 9 are indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 10, 11, 22 and 23 stand rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention, but are indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and to overcome the 35 USC 112 rejections. Claims 6 and 18 are objected to for informalities. Claims 1, 7, 12, 25, 27 and 29 stand rejected under 35 U.S.C. 102(b) as being anticipated by Kim (US 2001/0005611). Claims 2, 3, 5, 8, 26 and 28 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Saito et al (US Patent No. 6,399,438) and Kobayashi (US 2003/0073280 A1). The specification is objected to.

In this paper, the specification is amended according to the suggestion of the Examiner. Claims 6, 10, 18, and 22 are amended to correct typographical errors therein. Claims 1 and 25 are amended to recite a novel and nonobvious feature of the invention. Support for these amendments can be found in Figs. 1A-1I.

Reconsideration of this application as amended is respectfully requested in light of the amendments and remarks contained below.

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Foreign Priority Claim

Applicant respectfully requests that the Examiner acknowledge the receipt of the certified copy of the priority document. In this regard, Applicant notes the box 13(a)(1) was left unchecked in the Office Action Summary.

Rejections under 35 USC 112

Claims 10, 11, 22 and 23 stand rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Claim 10 has been amended to depend from claim 9. Claim 22 is amended according to the suggestion of the Examiner to correct a typographical error therein. Applicant submits that the 35 USC 112 rejections are thereby overcome.

Rejections of the Claims under 102(b) and 103(a)

Claims 1, 7, 12, 25, 27 and 29 stand rejected under 35 U.S.C. 102(b) as being anticipated by Kim. Claims 2, 3, 5, 8, 26 and 28 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Saito et al and Kobayashi.

MPEP 2131 prescribes that to anticipate a claim, a reference must teach every element of the claim. In this regard, the Federal Circuit has held:

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

"The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 as amended recites a method of forming a bit line contact structure comprising, *inter alia*, "conformally forming a titanium layer on the substrate to fully and directly cover the

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transistor and the surface uncovered by the transistor," and "defining the tungsten layer, the titanium nitride layer and the titanium layer to form an inner landing pad conformally and directly covering the source/drain region and a sidewall of the transistor." Support for these limitations can be found in Figs. 1B, 1C, and 1D of the application. Care has been exercised to avoid introduction of new matter.

According to amended claim 1, a titanium layer, a titanium nitride layer, and a tungsten layer are sequentially and conformally formed on the substrate, in order to fully and directly cover the transistor and the substrate uncovered by the transistor.

Applicant submits that Kim does not teach or suggest a stacked structure of titanium/titanium nitride/tungsten conformally formed on the transistor and the substrate uncovered by the transistor as recited in claim 1. To the contrary, the conductive layer 122 relied upon by the office action in this regard is blanketly formed over the substrate resulting in an even upper surface thereof, as shown in Fig. 4 of Kim.

Moreover, Applicant submits that Kim does not teach or suggest a conductive layer being formed to fully and directly cover the entire surface of the transistor and the substrate uncovered by the transistor. In contrast, as described in paragraphs 53 to 54 of Kim, the conductive layer 122 is formed on a second interlayer insulating film 120 and over the substrate and the transistor, contacting only a part of the source/drain region through a contact hole formed throughout the first interlayer insulating film 116 and the second interlayer insulating film 120. Please see Fig. 4 of Kim in this regard.

Furthermore, claim 1 as amended recites the tungsten layer, the titanium nitride layer, and the titanium layer are defined by etching to form an inner landing pad conformally and directly covering the source/drain region and a sidewall of the transistor.

In contrast, Kim teaches etching the conductive layer 122 (titanium/titanium nitride/tungsten) to form separated contact plugs, as described in paragraph 56 and shown in Fig. 5 of Kim. Particularly, the contact plug is formed over the substrate and the transistor and contacts only a part of the source/drain region through a contact hole. Thus, it is Applicant's belief that Kim

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neither teaches or suggests the limitation of "defining the tungsten layer, the titanium nitride layer and the titanium layer to form an inner landing pad conformally and directly covering on the source/drain region and a sidewall of the transistor" as recited in amended claim 1.

Saito (US 6,399,438) teaches a method of manufacturing a semiconductor integrated circuit device, disclosing a tungsten layer defined by dry etching. However, Saito does not teach or suggest forming a titanium layer, a titanium nitride layer, and a tungsten layer on the substrate to fully and directly cover the transistor and the surface uncovered by the transistor. Furthermore, Saito does not teach or suggest that the tungsten layer, the titanium nitride layer, and the titanium layer are defined to obtain an inner landing pad which directly covers the entire surface of the source/drain region and a sidewall of the transistor.

Kobayashi (U.S. 2003/0073280) teaches a fabrication process of a semiconductor device, disclosing a tungsten layer defined by wet etching. However, Kobayashi does not teach or suggest the limitations of "conformally forming a titanium layer on the substrate to fully and directly cover the transistor and the surface uncovered by the transistor", "conformally forming a titanium nitride layer on the titanium layer", "conformally forming a tungsten layer on the titanium nitride layer", and "defining the tungsten layer, the titanium nitride layer and the titanium layer to form an inner landing pad conformally and directly covering the source/drain region and a sidewall of the transistor" as recited in amended claim 1.

As discussed above, Kim's patent fails to teach all of the limitations recited in amended claim 1. Furthermore, none of the references cited by the Examiner, when taken alone or in combination, teach or suggest all the limitations of amended claim 1. It is therefore respectfully submitted that amended claim 1 is in condition for allowance. Insofar as claims 2-12 depend either directly or indirectly from amended claim 1, it is Applicant's belief that these claims are also allowable.

Claim 25 as amended recites a bit line contact structure having comprising, *inter alia*, "a conformal inner landing pad formed to fully and directly cover a sidewall of the transistors and the source/drain region between the two adjacent transistors". Support the limitation can be found in Fig. 11 of the application. Care has been exercised to avoid introduction of new matter.

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As described above, Klm does not teach that a conformal inner landing pad is formed to fully and directly cover a sidewall of the transistors and the source/drain region between the two adjacent. Furthermore, neither Saito nor Kobayashi teach or suggest the limitation of "a conformal inner landing pad formed to fully and directly cover a sidewall of the transistors and the source/drain region between the two adjacent transistors" as recited in amended claim 25. It is therefore respectfully submitted that amended claim 25 is in condition for allowance. Insofar as claims 26-29 depend either directly or indirectly from amended claim 1, respectively, it is Applicant's belief that these claims are also allowable.

Conclusion

The Applicant believes that the application is now in condition for allowance and respectfully requests so.

Respectfully submitted,



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